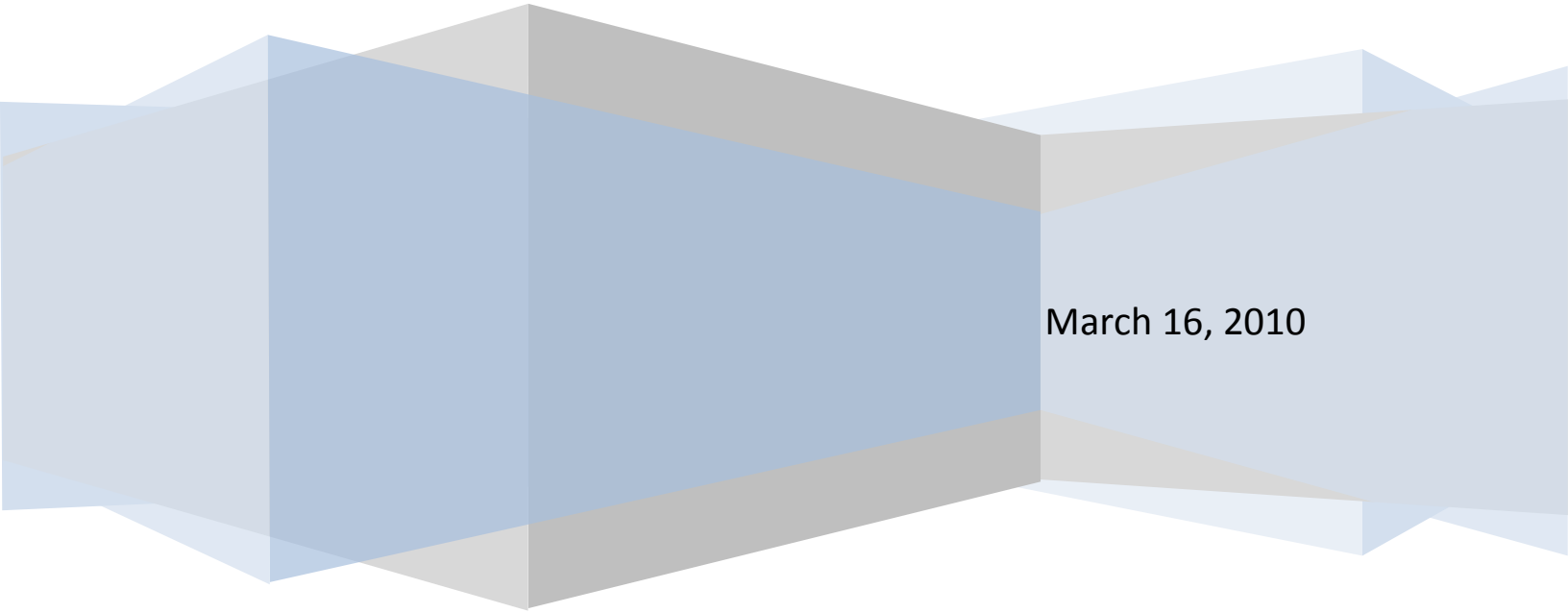
Loudoun County Department of Planning

Route 28 Keynote Employment Policies Comprehensive Plan Amendment
CPAM 2009-0001

Energy Efficiency and Green Building in the Route 28 Corridor

Discussion Paper 6 of 6



March 16, 2010

Introduction

On February 3, 2009, the Board of Supervisors initiated a Comprehensive Plan Amendment, CPAM 2009-0001 Route 28 Keynote Employment Policies, to consider retaining or changing Revised General Plan Keynote Employment land use policies for a specified area within the Route 28 Corridor. On December 15, 2009, the Board of Supervisors approved a workplan for the CPAM that builds upon the significant data and public input gathered through various Route 28 Corridor activities and initiatives since January 2008. These include the Belfort Park Task Force efforts, the Route 28 Existing Conditions Report, the Route 28 Business Outreach Project, and the Route 28 Market Study. All documents related to the CPAM, including numerous maps of the Route 28 Corridor, are available at www.loudoun.gov/route28.

Phase 1 of the workplan calls for active participation of Route 28 Stakeholders as work products are developed. To this end, a series of Discussion Papers have been developed on identified topic areas:

- **Economic Development in the Route 28 Corridor**
- **Potential Fiscal Impacts to Loudoun County**
- **Potential Fiscal Impacts to the Route 28 Tax District**
- **Potential Impacts to the Route 28 Corridor Transportation Network**
- **Housing in the Route 28 Corridor**
- **Energy Efficiency and Green Building in the Route 28 Corridor**

Purpose of Discussion Papers

The discussion papers are not intended to be an exhaustive discussion of the topic nor present final conclusions. They are intended to help establish the framework for stakeholder discussions at the upcoming facilitated workshops. Each paper provides a general background on the topic area, describes three general land use concepts that explore development patterns that may be desirable in the corridor, and discusses the advantages and disadvantages associated with each concept. Although the paper can be viewed as a stand-alone document, a reading of all the discussion papers will provide a more thorough understanding of policy options and stakeholder concerns regarding the Route 28 Corridor. Additional background data and policy or implementation options may be developed and/or refined based on stakeholder input as the Comprehensive Plan Amendment proceeds.

Background Discussion

The Route 28 Corridor has long been envisioned to develop as a major employment center in Loudoun County due to its location, transportation network, and proximity to the Washington Dulles International Airport.

As energy use continues to increase there are uncertainties over future pricing, supply security, environmental impacts and possible energy-related legislation. Businesses are starting to make investments in reducing energy useage and greenhouse gas emissions, controlling both costs and future

risks. According to the U.S. Green Building Council (USGBC), buildings account for 39% of total energy use, 72% of total electricity consumption, and 14% of all potable water[1]. However, certain types of uses consume higher amounts of electricity on a constant basis; such uses in the Route 28 Corridor include data centers and the Broad Run Water Reclamation Facility (See Attached Glossary for definitions related to energy efficiency terminology).

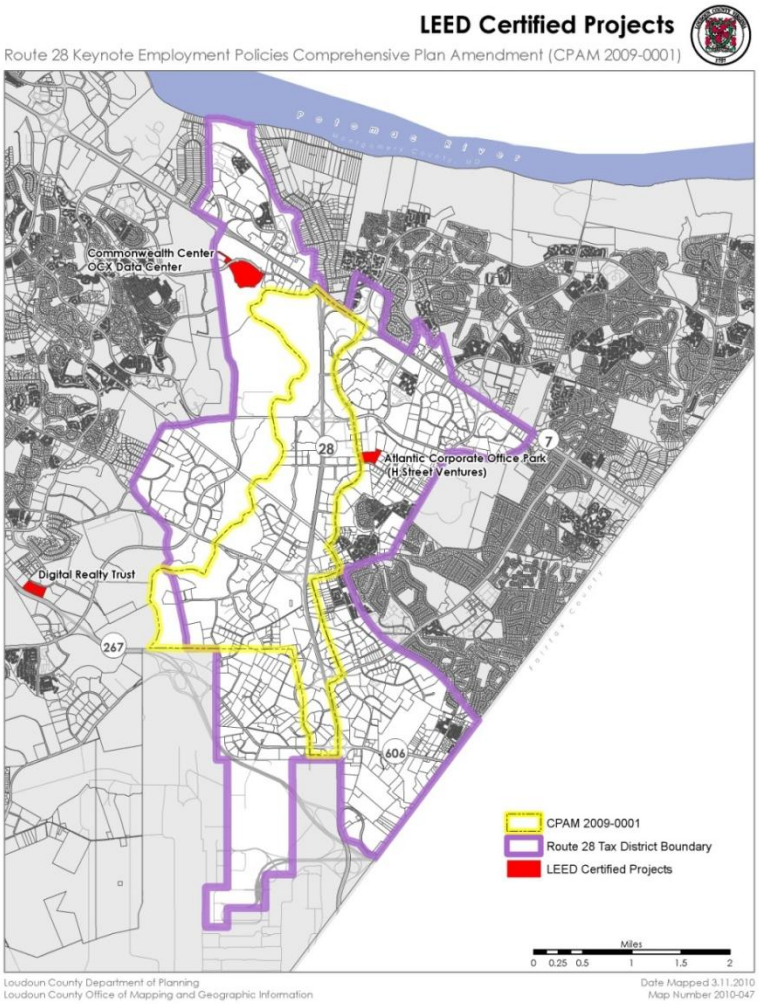
An upfront investment in green building design, on average, can result in life-cycle savings of more than ten times the initial investment. Sales prices for energy efficient buildings are as much as 10% higher per square foot than conventional buildings. When compared to an average commercial building, green buildings have 13% lower maintenance costs, 27% higher occupant satisfaction, 33% less greenhouse gas emissions, and consume 26% less energy[2]. A study conducted by the New Buildings Institute ("Energy Performance of Leadership in Energy and Environmental Design (LEED) for New Construction Buildings") identified that on average LEED certified buildings use 25-30% less energy than similar buildings without LEED certification. For higher levels of LEED certification (Gold and Platinum) energy usage can be reduced by as much as 50% when compared to non-LEED certified buildings[3].

Current efforts towards energy efficient design include: identifying energy efficiency as a strategic planning initiative; supporting the Metropolitan Washington Council of Governments (COG) "Greening the Metropolitan Washington Region's Built Environment" (which recommends individual jurisdictions promote green building through the LEED rating standards for new construction and multi-family residential projects; implementing energy efficiency in County facilities); and adopting the Countywide Energy Strategy (CES). As part of the CES, the County recognizes the need to promote energy awareness through outreach and communication efforts. Working cooperatively with the Loudoun County Chamber of Commerce, Loudoun County Small Business Center, and other business and professional organizations, a series of educational and incentive programs are planned to be developed with grant funding. One such program, endorsed by the Board in September 2009 is the "Green Business Challenge". The challenge encourages businesses to evaluate their operations and practices and identify and implement innovative ways to conserve energy. Beyond the savings in energy costs, businesses will earn recognition as a "green business" and receive publicity through press releases. Awards will be given later this year. To date, fifteen companies have submitted applications to compete in the challenge.

[1] U.S. Green Building Council, Green Building Facts, www.usgbc.org
[2] Ibid
[3] www.newbuildings.org

Existing Conditions and Trends

Building design and energy infrastructure have an impact on energy supply and demand. Currently existing buildings rely on electricity generated outside of Loudoun County, transmitted through the electricity grid, along with natural gas pipelines. The rate of energy demand is also affected by building codes and standards these codes reference. State building codes and standards are trending towards energy efficiency and green building. Any changes above current code requirements will translate to minimum building code requirements enforced locally. Even without the changes to current code requirements some developments in or near the Route 28 Corridor have chosen to voluntarily exceed minimum building standards through adoption of the LEED certification. As of 2008, the following projects have received LEED Certification: Atlantic Corporate Office Park, Commonwealth Center OCX Data Center, and space owned by Digital Realty Trust (See Map). Several other projects are registered but have not yet received certification.

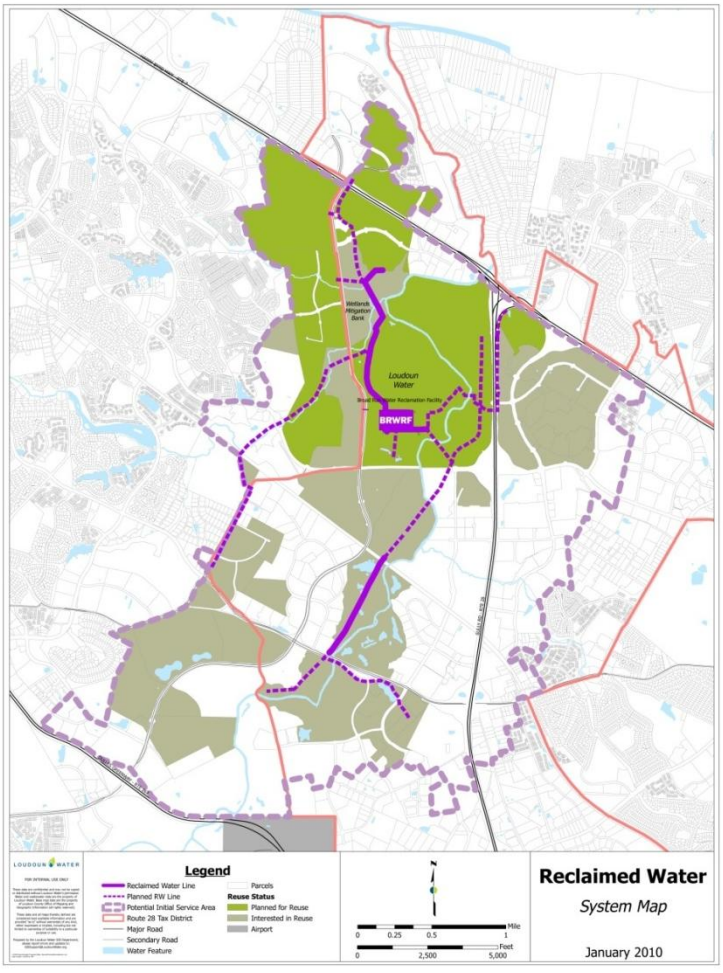


In 2008, the Board of Supervisors established LEED Silver as the goal for all government facilities constructed in Loudoun County. The recently constructed Homeless Shelter in the Leesburg Joint Land Management Area is the first County project to be developed with a green design throughout the entire design process. The Loudoun County Department of Capital Construction and Waste Management Services is still in the process of submitting the paperwork for this building, but anticipate the possibility of achieving LEED Gold Certification. Several other County facilities, both new construction and renovations of existing buildings, currently in the design process are all being designed to a minimum of LEED Silver. As of January 12, 2010, Loudoun County Public Schools has also adopted policies for "High Performance Design and Construction for Energy Efficiency and Environmental Impact" and "Energy and Water Management/Conservation." The policies emphasize efficient operation as well as design and are reflected in the more than two dozen buildings operated by LCPS that earn Energy Star certification (See Box 1 Below).

Reclaimed water is a district utility currently within the Route 28 Corridor that can enable more efficient water use. Reclaimed water, sometimes called recycled water or purple pipe[4] from Loudoun Water's Broad Run Water Reclamation Facility is wastewater that has been thoroughly treated so that it can be reused for non-potable purposes such as irrigation rather than being discharged to surface water. The use of reclaimed water has the potential to foster sustainable design in the Route 28 Corridor. To date three commercial properties within Loudoun Water's water reuse service area have requested the use of reclaimed water for irrigation, toilets, and cooling tower coolant to earn points toward LEED certification. As can be seen from the Reclaimed Water System Map a large portion of the Route 28 Tax District is within the water reuse service area (See Map). District utilities can also include district energy utilities.

BOX 1. ENERGY STAR Labeled Buildings

- Arcola Elementary School
- Ball's Bluff Elementary School
- Belmont Station Elementary School
- Countryside Elementary School
- Douglass Support Facility
- Emerick Elementary School
- Forest Grove Elementary School
- Freedom High School
- Hillside Elementary School
- Hutchison Farm Elementary School
- Leesburg Elementary School
- Legacy Elementary School
- Little River Elementary School
- Lovettsville Elementary School
- Lowes Island Elementary School
- Meadowland Elementary School
- Middleburg Elementary School
- Mill Run Elementary School
- Newton Lee Elementary School
- Pinebrook Elementary School
- Potowmack Elementary School
- Reid Elementary School
- Sanders Corner Elementary School
- Seldens Landing Elementary School
- Sycolin Creek Elementary School



In the coming decades, development in the Route 28 Corridor will connect to an electric grid that is evolving into a "smart grid" (See Glossary). The transformation to a "smart grid" will move from a centralized, producer-controlled network to one that is less centralized and more consumer-interactive. "Smart grid" technology will enable consumers to use

[4] Purple is the color for water reuse; water reuse regulation calls for the pipe to be Pantone 522.

and sell electricity more efficiently while at the same time allowing utilities the ability to detect problems on their systems and operate them more efficiently[5].

Countywide Energy Strategy (CES)

The County's adopted CES recommends strategies for the County to pursue that could achieve greater energy efficiency in buildings; efficient quality assurance through building performance labels; greater use of local power sources including combined heat and power, district energy, and renewable resources like wind, solar, ground source heat pumps and biogas electrification; and mixed-use development that substitutes bike, pedestrian, and shared transportation options in lieu of single occupancy vehicle use. The primary goals of the CES are to have the County recognized as a location of choice due in part to the County's innovative strategy; lower energy costs when compared to surrounding areas; among the lowest greenhouse gas emissions in the country; and to have the County recognized as a role model of effective energy and climate management.

Sustainable Development

Green building rating systems allow a consistent metric with which to measure site development and building performance. Also, rating systems raise the awareness of the environmental impacts of site development and buildings and help determine measures to minimize those impacts. A rating system appropriate for all types of development is the draft Sustainable Sites Initiative (SSI), the first national rating system for sustainable landscapes. The SSI recognizes that the services people enjoy from healthy ecosystems are the unobtrusive foundation of daily life. The SSI is dedicated to fostering a transformation in land development and management practices that will bring the essential importance of ecosystem services to the forefront. Certified landscapes have the potential to reduce greenhouse gas emissions, energy consumption, stormwater runoff pollution, and yard waste while controlling the spread of invasive species and improving the health of site users. The guidelines apply to any site, with or without buildings, and of any size, from a corporate campus to a single-family home. Beginning in 2010, a number of pilot projects will help test and refine the Guidelines with a formal introduction of the SSI scheduled for 2012. There are 9 areas of focus: site selection, assessment & planning, water, soil & vegetation, materials selection, human health & well-being, construction, operations & maintenance, and monitoring & innovation. The USGBC is participating in the SSI and anticipates incorporating the Guidelines and Performance Benchmarks into future versions of LEED.

Revised General Plan – Existing Policies

The policies in the Revised General Plan are limited with respect to energy use, conservation, and building standards and therefore do not account for many of the emerging energy trends. Chapter 2 of the Revised General Plan describes goals for energy and communication facilities, where the County supports "timely delivery to businesses and households as development occurs, but seeks to minimize the negative visual impacts through regulations and the Commission Permit process". The Plan recognizes the special energy needs of certain business uses like data centers. Policies also call for

[5] United States Department of Energy, www.oe.energy.gov

electric generation facilities that use environmentally sound and proven fuel sources for power generation to only be located where their impact on surrounding land uses and the environment are compatible. Chapter 5 of the Revised General Plan includes policies that seek to achieve a high quality built environment. Built environment policies provide for incentives for innovation and good design which include the provision of two annual awards of certificates of excellence in environmental design, though green building and energy conservation standards are not explicit criteria.

Green building standards and energy conservation are acknowledged for one land use type: unmet housing needs. In 2007, the Loudoun County Board of Supervisors encouraged energy efficient design through the adoption of the Countywide Housing Policies (CPAM 2007-0001). Housing policies encourage "energy efficient design and construction principles, promote high performance and sustainable buildings, and minimize construction waste and other negative environmental impacts."

Existing Incentives

In 2007, the Planned Development-Mixed Use Business (PD-MUB) district was approved as a new district to the Zoning Ordinance, where a 0.1-Floor Area Ratio (FAR) increase is awarded to developments that build at least 20 percent of the project to the LEED "gold" certified level. The PD-MUB zoning district also offers 0.1-FAR increases independent of LEED certification (See Box 2). Though some options are conducive to green building like including structured parking or public transportation improvements, other FAR increases are neutral like removing existing, direct access to an arterial roadway. Because an applicant only needs to meet five of the seven criteria to achieve the maximum permitted 1.0 FAR, the ease of achieving some of the other incentives offered may lessen the attractiveness of pursuing a green building certification. To date, two applications are requesting to rezone to the PD-MUB district, both of which are active. While both applications are seeking an FAR increase above the maximum permitted FAR, neither are pursuing the LEED certification incentive.

BOX 2. Section 4-1300: PD-MUB Zoning District:

- 0.5 Maximum FAR
- The Board may grant an increase of 0.1 FAR above the maximum FAR, not to exceed a total of 1.0 FAR for the district if any of the following is achieved:
  - The district is a minimum of 100 acres
  - 50% of the required parking is structured parking. An increase of 0.2 FAR above the maximum if 100% of the off-street parking is within structured parking.
  - At least 10% of the dwelling units provided are affordable to households earning up to 100% of the Washington Area median income (AMI), are located in vertically mixed buildings, and maintain affordability for a minimum of 15 years.
  - If a development provides at least one of the following: a full-service hotel, an adult day care facility, or indoor theater, limited to live performances. The FAR of these uses will be excluded from the FAR calculations.
  - A local shuttle service or other public transportation improvement is provided.
  - At least 2 contiguous lots both having frontage on an arterial road submit a single zoning map amendment to a PD-MUB district with no direct access onto an arterial road.
  - At least 20% of the total floor area achieves LEED Gold Certification

Chapter 868 of the Codified Ordinance was adopted in 1979 and further amended in 1991. This chapter exempts the value of eligible solar energy equipment from the property assessment where the solar energy equipment is installed. The exemption lasts for ten years. According to the Loudoun County Assessor's office, this exemption has only been pursued by two property owners.

Incentives and grant programs for energy efficiency and green building have greatly expanded in recent years. Many are specific to certain consumer types, business or residential types, and products[6]. State law has also been amended to allow local governments to provide property tax incentives. Nearby jurisdictions are also aggressively pursuing energy conservation and green building goals (See Box 3 Below). Ongoing efforts include the Tysons Corner area plan in Fairfax County that incentivizes LEED certification and encourages renewable energy and combined heat and power, the overall General Plan amendment in Prince William County, and the requirement by the District of Columbia government for property owners to measure energy and water use for commercial buildings and to disclose this information to potential tenants and buyers.

[6] See www.dsireusa.org

BOX 3. Examples of policy and regulatory documents used to promote energy efficient design in neighboring jurisdictions. For more information see Metropolitan Washington Council of Governments, Intergovernmental Green Building Group's

Regional Green Building Policies and Programs Overview

Arlington County

- Bonus density and/or height for achieving LEED certification. Incentives vary between the different levels of LEED certification and
- LEED Checklist required for all site plan projects seeking a special exception. Contribution to Green Building Fund for projects not seeking LEED certification.

City of Alexandria

- LEED Silver or equivalent for all non-residential development requiring a Development Site Plan or Development Special Use Permit and LEED certified or equivalent for all residential development.

Fairfax County

- LEED certification or equivalent for non-residential development and zoning proposals for multi-family residential four or more stories when certain criteria is met and
- Encourage monetary contributions to be refunded upon demonstration of LEED certification or equivalent.

Fairfax County – Draft Tysons Corner Urban Center Plan Amendment

- LEED Silver or equivalent for all new buildings, LEED Gold and Platinum levels are encouraged through incentives, such as an increase in total allowable FAR;
- Consideration of tax abatement or other cost recovery strategies in the future; and
- Consideration of on-site generation of electricity, the use of community energy distribution systems, transit-oriented development, the use of energy efficient heating and cooling systems, and the application of enhanced building commissioning to provide early and ongoing verification of system performance.

Prince William County – Update to Comp Plan Environmental Chapter

- Development of Community Energy Master Plan;
- Incentives for energy conservation and renewable energy applications, such as lesser tax rate for energy efficient buildings as well as additional incentives (financial, tax, expedited permits, density bonuses, etc.) for development that builds to LEED or Green Globe standards and ENERGY STAR; and
- Education and awareness by County example.

SOURCE: http://www.mwcog.org/uploads/committee-documents/kV5bXl1Z20090611132506.pdf

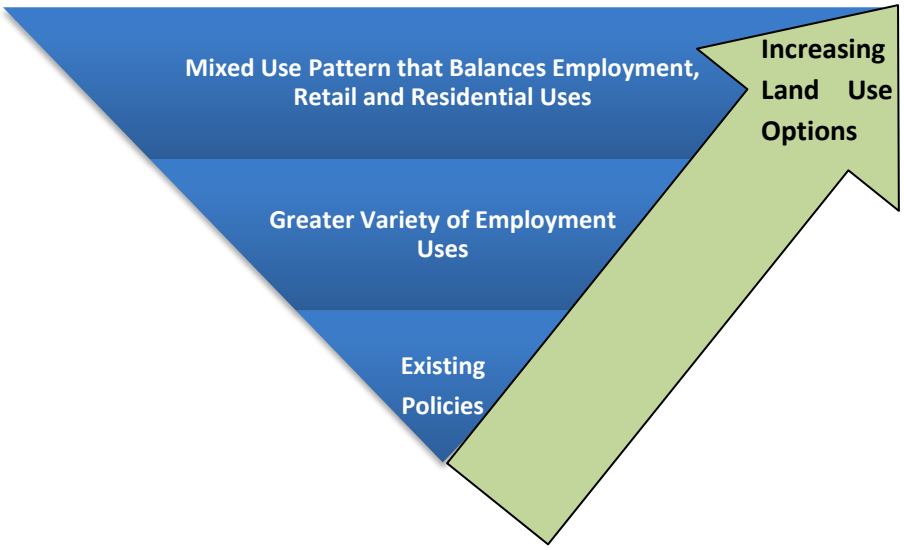
Public Input *(Route 28 Business Outreach Project, Belfort Park Task Force and Route 28 Market Study[7])*

The Route 28 Business Outreach Project Results Report Guiding Principle 16 encourages sustainable development practices in the Route 28 Corridor. The Results Report identified density incentives for energy-efficient design as an incentive to encourage conversion of properties within the Route 28 Tax District from the 1972 Zoning Ordinance to the Revised 1993 Zoning Ordinance. On December 3, 2009 the Loudoun County Planning Commission sent a letter to the Board of Supervisors requesting the Board "adopt a resolution directing staff to incorporate sustainable development concepts including green building, energy efficiency, reduced carbon and greenhouse emissions as appropriate into currently-initiated and future policy initiatives". The Planning Commission identified the Route 28 Keynote Employment Policies Comprehensive Plan Amendment as an opportunity to introduce sustainable development concepts into County policy documents. This is consistent with the Route 28 Market Study which identified as development and redevelopment is contemplated within the Route 28 Corridor there is an opportunity to include desired elements of connectivity and multiple-modes, developing an area that could be branded the region's sustainable corridor.

Analysis of Possible Land Use Concepts

In this paper, three potential land use concepts are discussed in terms of energy efficiency. The three concepts provide a continuum of increasing land development options, as illustrated in the figure below, and include: *Existing Policies Retained in the Route 28 Corridor* (Concept 1), *Route 28 Includes a Greater Variety of Employment Uses* (No Residential) (Concept 2), and *Route 28 Corridor Policies Emphasize a Mixed Use Pattern that Balances Employment, Retail and Residential Uses* (Concept 3). These concepts are not mutually exclusive and are intended to build upon each other.

[7] During March and April, 2009, County staff conducted one-on-one interviews with Route 28 Corridor stakeholders to obtain their perceptions of the corridor, its current state of development, challenges for the future, and ways the County could improve the corridor's development potential. Additionally, stakeholder comments made during a Board of Supervisors-sponsored Breakfast Forum, also held in April 2009, supplemented comments received during the interviews. County staff documented the results of these efforts in the *Route 28 Business Outreach Project Results Report*, June 2, 2009. Following the Outreach effort, the County contracted with a private consultant to perform a Route 28 market analysis to assess the corridor's potential for Class A office space under current conditions and recommend a vision for maximizing the economic development potential of the overall corridor. The consultant presented the results of the market analysis in the *Route 28 Corridor Analysis of Development Potential for Class A Office Space*, August 27, 2009. Both of these reports are available at www.loudoun.gov/route28.



The difference in the potential to conserve energy and promote green building between the three concepts is minimal. While industrial uses typically are the highest energy users followed by transportation, residential, and commercial uses, site and building design factor significantly in the amount of energy used rather than the land use itself. The design of a building as well as opportunities for viable energy options such as, renewable energy production (wind, solar, ground source heat pumps, and biogas electrification) and combined heat and power (CHP)[8] allows for the displacement of demand that would otherwise have to be supplied by the electric grid. The Route 28 Corridor could become more sustainable by developing in ways that minimize reliance on energy that must be imported from outside the County. Projects that are large enough to capture the combined value of efficient use, efficient distribution, and clean and renewable energy can range from mixed-use developments (with or without residential development) to single large commercial or institutional developments. Over time, multiple projects could blend together to obtain more benefits.

The key difference between the three concepts is the ability to create a walkable community thereby lessening transportation energy usage. Existing Keynote Employment policies (Concept 1) call for single-use, large-scale regional office developments that feature high visual quality and high trip-generating uses with ancillary services necessary to support them. Support services within Keynote Employment developments allow for potential reductions in vehicle miles traveled; however, Keynote Employment is typically a high trip-generating use (See Discussion Paper #4, *Potential Impacts to the Route 28 Corridor Transportation Network*). The heavily landscaped greens and tree-lined boulevards called for in Keynote Employment developments typically place more of a demand on water usage. However, the use of

[8] Combined Heat and Power (CHP) is a type of cogeneration, where electricity and useful heat are produced simultaneously. CHP can occur where the heat source has a relatively low temperature, like with water or space heating.

reclaimed water from Loudoun Water's Broad Run Water Reclamation Facility or rainwater harvesting could reduce the impacts associated with increased water usage for irrigation purposes.

Existing policies also provide an additional development option for properties located within the three Destination Retail Overlays. Destination Retail is comprised of large scale retail uses that demand a regional market, and rely heavily on automobile access. They are intended to be located outside of residential areas along planned and future principal arterial corridors where the County's transportation network can accommodate auto intense retail uses (See Discussion Paper #4, *Potential Impacts to the Route 28 Corridor Transportation Network*). While a combination of retail uses within one area could potentially reduce the number of retail trips, Destination Retail uses are still the highest trip generating use within the Route 28 Corridor.

Compact, mixed-use development as proposed in concepts 2 and 3 along with multi-modal transportation options will help to reduce transportation energy use by reducing vehicle miles traveled. In addition, aggressive transportation demand management programs could be explored to help achieve a further reduction in vehicle miles traveled. The more amenities within close proximity to office buildings or within the buildings themselves will create more opportunities for office users to walk to lunch and run errands without having to get into their car. In addition, opportunities exist under concepts 2 and 3 for different types of office uses to be located in close proximity, such as medical offices located within the same building or adjacent to an employee's workplace. Concepts 2 and 3 also provide additional employment opportunities within the Route 28 Corridor (see Discussion Paper #1, *Economic Development in the Route 28 Corridor*) affording the opportunity to reduce outbound commuting through a successful growth of local employment opportunities. While the lack of residential uses in concept 2 does not afford an individual to live and work within the same community, unless services, such as schools, libraries, parks, etc. are provided within the Route 28 Corridor the residents of these communities will have to travel outside of the corridor for these services.

Any changes to existing land use policies in the Route 28 Corridor should be aimed at maximizing its competitive advantage, creating more opportunities and incentives for energy efficient design and promoting land development practices that reduce the impact of the built environment on citizens and the land. Incorporating the recommendations outlined in the CES into policies in the Revised General Plan will help guide development proposals and achieve energy efficient design and green building with a possible outcome of having a net-zero Route 28 Corridor (where the Corridor produces as much power as it consumes). Adjacent jurisdictions have also either recently adopted or are in the process of adopting policies promoting green buildings (See Box 3 above). Some of the initiatives undertaken by adjacent jurisdictions could be considered for Loudoun and for development within the Route 28 Corridor to achieve energy efficient design.

GLOSSARY

Green Building – The design of new buildings that conserves energy, water, maximizes indoor air quality and natural light, and minimizes construction waste and disturbance of natural landscapes.

Energy Conservation – Encompasses efficient production, transmission, and consumption of electricity and other energy sources.

Leadership in Energy and Environmental Design (LEED) – A third-party certification program and nationally accepted benchmark for the design, construction, and operation of high performance green buildings. Created by the U.S. Green Building Council (USGBC), the program awards varying levels of certification (LEED Certified, LEED Silver, LEED Gold, and LEED Platinum) to buildings that meet LEED rating standards in five major categories: sustainable site development, water savings, energy efficiency, materials selection, and indoor environmental quality. LEED standards exist for new construction as well as existing buildings and remodeling, and can be applied to homes, commercial facilities and even neighborhood development.

Smart Grid – An automated, widely distributed energy delivery network characterized by a two-way flow of electricity and information capable of monitoring everything from power plants to customer preferences to individual appliances (From "The Smart Grid: an Introduction, Department of Energy, 2008).

Sustainability – Indicates the capability of being continued with minimal long-term effect on the environment.